# Preface

As China moves into a new phase in its economic development, innovation in science and technology will play a critical role. Dramatic productivity increases based on knowledge will be required to maintain economic growth as investment in fixed assets alone will no longer achieve the startling improvements of the past.

The good news is that there is much opportunity for China to capture the benefits of science and technology. The capacity to develop technology globally is increasing, and the barriers to dissemination are falling. Moreover, as a fast developing economy with great scale China is capable of harnessing the power of mass entrepreneurship to develop its own technology and make a global contribution.

This book provides a roadmap to the opportunities for China's science and technology development in the 13th Five-Year Plan period. Information technology including cloud computing, internet of things, and big data promise to revolutionize business and society with products and services better able to meet consumer needs and at lower cost. Industry 4.0 will transform manufacturing through digitization, 3D printing and materials science innovation to enable a far greater range of customization and efficiency in service and delivery. Robotics and autonomous vehicles may have disruptive effects on both the workplace and society as consumers and businesses transition to future that is safer but also requires far greater workforce skills. The world of energy and resources will be transformed as renewable energies continue to develop alongside shale, light tight oil, and biotechnology and other resources. Each of these technology trends will affect industries and services throughout China, challenging incumbents but benefiting consumers and modernizing society.

Drawing on research of the McKinsey Global Institute, and the Urban China Initiative, we hope this book provides useful input for the planning and development of China's technology enterprises and government institutions. We believe there is great potential for China's science and technology in the years to come!

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Conversely, when a new technological revolution emerges, even though the new technology first appears in a developed country, their technological systems are in an early, primitive stage, where most of their scientific and technological knowledge is in the public domain and at the lab research phase. Therefore, there is still a low awareness of the knowledge. If a less developed country can enter the new technological system quickly at this juncture, it would cause a disruptive impact. Therefore, we should not only take history as a reference, but also scientifically predict and actively seize opportunities of the fifth technological revolution. This will enable us to shift from being a follower to a leader, from a low to a high-end industry, and from the low to the high end of the value chain, becoming an active player and competitor globally in the future.

From a strategic perspective, new technologies are of great significance to upgrading and transforming China's industrial structure. Since the economic reform and opening up, China has entered the early stage of industrialization, shifting from labor to resource-intensive processing and manufacturing, and achieving rapid economic development. However, such an industrial model yields low profit margins with high consumption of materials and resources as well as significant impact on the ecological environment. Whether in terms of cost-effectiveness and sustainability, China needs to transform and upgrade its industrial framework for its economic growth. In adjusting its industrial structure, China should strive to develop strategic emerging industries, promote new energies, and support energy conservation and environmental protection, to build a high-tech low-carbon economy. New technologies (including advanced manufacturing, biotechnology, information, energy and intelligent technology) can provide opportunities and guide the strategic direction for, and accelerate the process of upgrading China's industrial structure.

From the industrial level, new technologies will accelerate the improvement of China's industrial structure. Such upgrading and transformation are no longer confined to structures between industries. It is now also necessary to "dig deep" within an industry to enhance its inner framework, for example to upgrade from a labor to technology-intensive model in the same industry. Within the industrial structure, the primary industry has gradually been replaced by the secondary and tertiary industries as those with a more competitive advantage. In the future, an industry will need to rely on new technologies for processing and reprocessing to achieve deeper, vertical growth and improve its production efficiency continuously, so as to upgrade and transform the industrial structure. Each industry will have to use new technologies to add value to itself based on its comprehensive strength and comparative advantages.

We believe that science is key to predicting and capturing the areas in which the fifth scientific and technological revolutions will occur and the industries they may impact. McKinsey has compiled the relevant research data and added economic benefit indicators for quantitative screening to identify 12 disruptive technologies; we then grew that list to include 14. We believe that the fifth scientific and technology revolutions are most likely to occur in interdisciplinary fields such as information technology, biotechnology, new energies, and new materials.